additional treatment to the optical device.

a2 cont.

15. (Amended) The method of Claim 14 further comprising the step of selecting a ferroelectric liquid crystal material having a phase sequence of Isotropic – Nematic – Smectic A –Smectic C* – Crystalline states.

REMARKS

This Amendment and Response is responsive to the Office Action mailed February 15, 2002. In that Action: Claims 1-22 were pending; Claims 1-22 were rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention; and Claims 1-22 were rejected under 35 USC §102(b) as being anticipated by Bos (USPN 4,900,132).

Claims 1, 2, and 13-15 have been amended to address the Section 112 rejections and to place the claims into better form. Reconsideration of the rejections of Claims 1-22 is hereby requested.

Each of the Section 112 rejections have been addressed by amendments, with the exception of the rejection of Claims 10 and 13 because the specification allegedly did not disclose the means for electrically addressing the optical device. To the contrary, it is submitted that the means for electrically addressing the optical device is disclosed in Figure 4C (reference numbers 334A and B, 340, and 342) and at page 7 of the specification, lines 4-5 and 32-35.

Claims 1-22 have been rejected as anticipated by Bos. Bos appears to disclose a chiral liquid crystal cell 10 (Figure 1) that includes a pair of parallel, spaced-apart electrode structures 12 and 14. A layer of liquid crystal material 16 is contained between the electrode structures 12

and 14. The portion of the electrode structures 12 and 14 that is adjacent to the liquid crystal layer 16 is a pair of alignment film layers 22 and 22'. As is well known in the art, each alignment film layer 22 and 22' has an alignment direction in the plane of the alignment layer along which a projection of the directors of the molecules of liquid crystal layer 16 adjacent to the alignment layer will align. Bos further describes the disadvantages of an arrangement of opposed alignment layers wherein the alignment directions point in parallel, but opposite direction (column 1, line 59 through column 2, line 32). Bos refers to this as an "anti-parallel alignment". Although Bos appears to never explicitly make the statement, it can be understood by a person with ordinary skill in the art that the preferred embodiment described in Bos is a "parallel alignment" device, in which the two alignment layers 22 and 22' are aligned in directions that are parallel to each other and pointed in the same direction. Bos also describes pretilt angle which, as shown in Figure 2, is an angle in the plane of the drawing of Figure 2 and is identified as $+\Theta$ with respect to the molecules adjacent to alignment layer 22 and $-\Theta$ with respect to the molecules adjacent to alignment layer 22'. Bos is attempting to control the pretilt angle in order to increase the wide-angle viewing characteristics of the device. Of course, since the pretilt angle is in the plane of the Figure 2 and the alignment direction angle is in the plane of alignment layers 22 and 22', it is clear that the tilt angle and alignment direction are two completely different concepts and terms. Even viewing Bos in the light least favorable to patentability of the present invention, it is silent as to the relative alignment direction of the two opposed alignment layers. Viewing the document as a whole as discussed above, however, Bos discloses a device where the alignment direction of the two opposed alignment layers is parallel, with an angle of zero therebetween.

Independent Claims 1, 13, and 14, on the other hand, relate to an optical device with a ferroelectric liquid crystal material, the device including a first and second substrate, with alignment treatments applied to surfaces of the first and second substrate. The alignment treatment on each of the two substrates induces an orientation of at least a portion of the ferroelectric liquid crystal material therebetween along an alignment direction. The first and second substrates are located relative to each other in such a manner that the first and second alignment directions are not aligned with each other, so that a <u>non-zero angle Ω is formed between the projections of the two alignment directions on the two substrates</u>. In contrast, Bos discloses an arrangement in which the two alignment directions are completely aligned with each other, so that the angle between the alignment directions is zero. As can be seen, the claimed invention differs from Bos in this key aspect, and thus is not anticipated thereby. The amendments to Claims 1, 13, and 14 make it even clearer that the alignment direction and the pretilt angle of the portion of the FLC material are two different parameters. For all the above reasons, it is respectfully submitted that Claims 1, 13, and 14 are patentable over Bos, and that each of the dependent claims (Claims 2-12 and 15-22) are patentable as well.

Based upon the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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Marked-up Copy of the Amended Claims

1. (Amended) An optical device including a ferroelectric liquid crystal material, said optical device comprising:

a first and a second substrate;

a first alignment treatment applied to a surface of the first substrate, said first alignment treatment being intended to induce an orientation of at least a portion of said ferroelectric liquid crystal material along a first alignment direction <u>and</u> with a first pretilt angle α_1 with respect to a plane parallel to said first substrate;

a second alignment treatment applied to a surface of the second substrate, said second alignment treatment being intended to induce an orientation of at least another portion of said ferroelectric liquid crystal material along a second alignment direction <u>and</u> with a second pretilt angle α_2 with respect to a plane parallel to said second substrate; and

[means for securing] <u>wherein</u> the first substrate <u>is located</u> with respect to the second substrate in such a way that the surfaces of the first and second substrates onto which the first and second alignment treatments were applied, respectively, are spaced apart, generally parallel and facing each other and a projection of the first alignment direction onto the treated surface of the first substrate makes a non-zero angle Ω with respect to a projection of the second alignment direction onto the treated surface of the first substrate such that, said ferroelectric liquid crystal material being injected between the first and second substrates, the optical device is free of chevron structures without a need to otherwise apply an additional treatment to the optical device.

2. (Amended) An optical device of Claim 1 wherein said ferroelectric liquid crystal

material has a phase sequence of Isotropic – Nematic – Smectic A – Smectic C* – Crystalline states.

13. (Amended) An optical system comprising:

an optical device including

a ferroelectric liquid crystal material,

a first and a second substrate,

a first alignment treatment applied to a surface of the first substrate, said first alignment treatment being intended to induce an orientation of at least a portion of said ferroelectric liquid crystal material along a first alignment direction and with a first pretilt angle α_1 with respect to a plane parallel to said first substrate,

a second alignment treatment applied to a surface of the second substrate, said second alignment treatment being intended to induce an orientation of at least another portion of said ferroelectric liquid crystal material along a second alignment direction and with a second pretilt angle α_2 with respect to a plane parallel to said second substrate, and

[means for securing] wherein the first substrate is located with respect to the second substrate in such a way that the surfaces of the first and second substrates onto which the first and second alignment treatments were applied, respectively, are spaced apart, generally parallel and facing each other and a projection of the first alignment direction onto the treated surface of the first substrate makes a non-zero angle Ω with respect to a projection of the second alignment direction onto the treated surface of the first substrate such that, said ferroelectric liquid crystal material being injected between the first and second substrates, the optical device is free of chevron structures without a need to otherwise apply an additional treatment to the optical

device;

a light input directed at said optical device in such a way that the optical device in turn produces a light output of a particular optical state; and

means for electrically addressing said optical device in such a way that the particular optical state of the light output is continuously variable between a minimum optical state and a maximum optical state wherein an optical retardance of the optical device remains generally constant during said continuous variation of the optical state of the light output.

14. (Amended) In an optical device including a ferroelectric liquid crystal material, a method for preventing formation of chevron structures in the optical device, said method comprising the steps of:

providing a first and a second substrate;

applying a first alignment treatment to a surface of the first substrate, said first alignment treatment being intended to induce an orientation of at least a portion of said ferroelectric liquid crystal material along a first alignment direction <u>and</u> with a first pretilt angle α_1 with respect to a plane parallel to said first substrate;

applying a second alignment treatment to a surface of the second substrate, said second alignment treatment being intended to induce an orientation of at least another portion of said ferroelectric liquid crystal material along a second alignment direction <u>and</u> with a second pretilt angle α_2 with respect to a plane parallel to said second substrate;

[securing] <u>locating</u> the first substrate with respect to the second substrate in such a way that the surfaces of the first and second substrates onto which the first and second alignment treatments were applied, respectively, are spaced apart, generally parallel and facing each other

and a projection of the first alignment direction onto the treated surface of the first substrate makes a non-zero angle Ω with respect to a projection of the second alignment direction onto the treated surface of the first substrate; and

injecting the ferroelectric liquid crystal material between the first and second substrates such that the optical device is free of chevron structures without a need to otherwise apply an additional treatment to the optical device.

15. (Amended) The method of Claim 14 further comprising the step of selecting a ferroelectric liquid crystal material having a phase sequence of Isotropic – Nematic – Smectic A –Smectic C* – Crystalline states.